Space, Identity and Health Risks

A Study of Domestic Waste in Ibadan, Nigeria

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Abstract

Poor waste management has characterized Ibadan's modern and historical identity. As a consequence, residents of Ibadan (indigenes) hold diverse views about the city's image, while non-indigenes label it "filthy" and "dirty". These perceptions, spatial and cultural, are deep rooted, intertwining with the political and cultural plane of Nigerian society. A distinction between "self" and "others" is seen to mark a discourse and counter-discourse in the perception of health risks associated with domestic waste in Ibadan. Through survey and descriptive ethnography, our paper examines the nature and extent of domestic waste in Ibadan, as a physical, community and psychological reality, where we seek to explain how generation and poor waste management impact on these spaces and the very mechanics of identity. Different perceptions of health risks are observed as well as the vulnerability to diseases associated with waste and poor hygiene, bringing into play the socioeconomic variables and residential patterns which constitute the daily reality of this city. Our study establishes that the increase in urban population; the low economic status; the indiscriminate setting up of artisans' shops or outlets and the overall inability of government agencies to monitor the menace of domestic waste and its attendant health risks, are central factors to the problem generically deemed one of "waste."

***Keywords**: identity; space; health risks; domestic waste; income level; Ibadan*

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A Study of Domestic Waste in Ibadan, Nigeria

Aderemi Suleiman Ajala[1]

1. Introduction

In 1975, John Pepper Clark in his poetic rendition of Ibadan city touched upon an important aspect of its identity. He noted, through such adjectives, that Ibadan is "rusty", "flung" and "scattered.[2]" Since then, Ibadan's "rusty", "flung" and "scattered" (adjectival) identity seems unchanged except that the "rusty, dusty and filthy nature of Ibadan" continues to persist in such a way that makes the city synonymous with a "filthy space[3]". Even in the 2000s, a number of references are still made to the polluted spaces of Ibadan due to the improper management of domestic waste, which has assumed the nature of debris in most parts of the city[4]. Yet whilst the question of identity is a difficult one to ignore in the above references, equally, the health imperatives of Ibadan and its failure to change, and indeed adapt, can best be measured by the nature and extent of the production of domestic waste and its spatial management. Thus, three concepts – identity, space and health – dovetail in our ongoing discussion of the relationship between health, culture and society, all of which are articulated through the Ibadan (spatial) problematic.

As a recognizable and identifiable characteristic of an individual, group of individuals and cultural community, "identity" is a powerful force that influences human actions in society. Identity can also be taken as a persisting entity of a cultural community through which such a community is recognized as distinct and different to others[5] – it indeed becomes a differentiation point in both perception and debate. In the context of Ibadan city, community identity is defined topographically, that is, by the spatial pragmatics through which certain persistent attributes impact on people's health culture. Space in Ibadan health and waste management discourse connotes human, social and physical abodes which are capable of producing actions that can either promote or mar human wellbeing.[6] And like many other city spaces in sub-Saharan Africa, Ibadan space for a long time has interacted with

1 Department of Archaeology and Anthropology, University of Ibadan. Nigeria

2 Clark, J.P, "Ibadan", in Soyinka. W. (ed.) Poems of Black Africa, p.45.London,Heinemann, 1975.

3 Soyinka, W, Ibadan: The Penkelemes Years – A Memoir 1946-1965, p. 37. Ibadan, Spectrum Books, 1994.

4Asakitipi, E.A, "Environmental and Behavioural Risk factors Associated with Childhood Diarrhea in Ibadan Metropolis, Oyo State". Journal of Environment and Culture, Vol. 2(1): 1-13, 2005. Ajala, A.S, "Space Culture and Health Attitudes: A Threat to Child Survival in Ibadan City, Nigeria". Journal of Environment and Culture, 2(2): 106-117, 2005. Oluwajuyitan, J, "Cicero as a Yoruba god". The Nation, p. 15. November 2, 2010.

5Grotevant, H. D, Family Processes, Identity Development, and Behavioral Outcomes for Adopted Adolescents. Journal of Adolescent Research, 12(1), p.139, 1997.

6Ajala, A.S, "Space Culture and Health Attitudes: A Threat to Child Survival in Ibadan City, Nigeria". Journal of Environment and Culture, 2(2): 106-117, 2005.

a number of cultural factors which eventually characterized the Ibadan people and its lived social space as endemic to poor waste management, vulnerable to certain diseases such as malaria, cholera, typhoid and diarrhea.[7]

In many African cities, the unprecedented growth in population accounts for an increase in the production of waste and its consequentially poor management.[8] Cities such as Lagos, Ibadan, Kano, Accra, Nairobi and Dar es Salam recorded that between 1990 and 2000 the population increased in a range between 3 and 10% annually. Many of these cities also witnessed an increase in domestically generated waste that falls within 0.3 – 1.4kg per day[9] . In Nigeria, an estimated 0.43kg of domestic waste was generated per person per day in 2007 as against 0.27kg that was recorded in the 1990s[10]. Using Nigeria's population of 158 million people in 2011 as a comparative measure, with an annual increase of 3%, the country is capable of generating approximately 70.2 million kg of domestic waste per person per day. In the specific context of Ibadan city, with about 2.8 million people,[11] 1.6 million kg of domestic waste is produced.[12]The above statistics, which are alarming, suggest that there is a correlation between the human population; the generation of waste and the management strategies which are either in, or out of, place. This correlation and stark dissymmetry can be explained through the analysis of certain competing factors: firstly, the teeming population of city dwellers negotiates for city space for socioeconomic purposes, leaving little consideration for the management of domestic waste and hygiene standards. Secondly, in sub-Saharan Africa, many city dwellers are losing both the aesthetic value of space, directly experiencing the health effects of their relationships to domestic waste. Hence, Mabogunje once observed, "[…] that severe poor sanitary conditions through unregulated competition for space characterize many African urban centers[13]" in such a way that exposes the population to health hazards inherent in the air, land and water.[14]Indeed, since the 1980s to the present day, Ibadan still suffers from the effects of poor waste management: the city's health continues to be affected by many diseases due to undefined and unimplemented community programs, and occurrences of cholera, typhoid, diarrhea, malaria and skin infections among the populace in some parts of the city between 2000 and 2011 were largely due to the improper implementation of an already weak regulation.[15]

Domestic waste in Ibadan is mainly solid and liquid in nature. That which is commonly sighted includes human excreta in many parts of the city and household sewage that flows in uncovered drainages, which are mostly blocked with both consumer and industrial debris. The proliferation of artisan workshops for auto mechanics, carpentry and joinery, vulcanizing, water packaging industries and operations of traditional open market systems in

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7Asakitipi, E.A, "Environmental and Behavioural Risk factors Associated with Childhood Diarrhea in Ibadan Metropolis, Oyo State". Journal of Environment and Culture, Vol. 2(1): 1-13, 2005. Ajala, A.S, "Space Culture and Health Attitudes: A Threat to Child Survival in Ibadan City, Nigeria". Journal of Environment and Culture, 2(2): 106-117, 2005.

8Nweke, O.C. and W.H. Sanders, Modern Environmental Hazards: A Public Health Issue of Increasing Significance in Africa. Journal of Environmental Health Perspectives, Volume 117(6): 863-870, 2009.

9Onibokun, A. and A. Kumuyi, "Ibadan, Nigeria". In; Onibokun, A.G. (ed.), Managing the Monster: Urban Waste and Governance in Africa, pp.101-172. Ottawa, IDRC, 1999.

10Shridher, M. et. al., "Sustainable Waste Management through Integrated Waste Recycling". International Journal of Environmental, Cultural, Economic and Social Sustainability, Vol. 3(3): 103-112, 2008.

11 NPC, Nigerian Provisional Population Figures. Abuja, Federal Ministry of Information, 2006.

12Ademola, B, Ibadan Generates 5,000 Tons of Refuse Daily. Compass Newspaper Wednesday 04 March,p.27, 2009.

13Mabogunje, A.L, The Development Process. A Spatial Perspective,p.72 London, Unwin Harman Ltd. 2nd Edition, 1980.

14Onibokun, A. and A. Kumuyi, "Ibadan Nigeria". In; Onibokun, A.G. (ed.), Managing the Monster: Urban Waste and Governance in Africa, pp.101-172.Ottawa, IDRC, 1999.

15Asakitipi, E.A, "Environmental and Behavioural Risk factors Associated with Childhood Diarrhea in Ibadan Metropolis, Oyo State". Journal of Environment and Culture, Vol. 2(1): 1-13, 2005. Ajala, A.S, "Space Culture and Health Attitudes: A Threat to Child Survival in Ibadan City, Nigeria". *Journal of Environment and Culture, 2(2):* 106-117, 2005. WHO, *2008 Environmental Health Surveillance in Nigeria*, p.27. Abuja, World Health Organization Country Office, 2009.

the city, compound the problem of waste management and makes regulation a difficult goal to achieve. Through these economic activities metal carcasses, unused tyres, nylon packs and plastic water bottles which are by-products from the water packaging industries litter almost everywhere in Ibadan: many public places are exposed to practices that continue to reinforce Ibadan's identity as fundamentally unsanitary in nature.

Despite these factors, the context of waste in Ibadan is a complex phenomenon in view of the different perceptions furnished by both non-indigenous and indigenous residents, where waste has seemingly created two symbolic sets of perceptive representations (self and others) emblematic of the conceptualizing of space, identity and health among the different residents of the city.

In recent times, this conceptualization has also created a blurred demarcation of the corporeal and spiritual among the Yoruba of South-western Nigeria[16] . The traditional Yoruban notion of space is strict in that it divides into the individual (corporeal) and community (spiritual)[17]. While individual spaces are those that are exclusively and autonomously managed by individuals themselves, community spaces are managed and experienced collectively: individual space is reduced to personal abodes such as personal rooms, stores and individual house frontages (with a limited range depending on the socioeconomic status of the owner); community space includes roads (*Ona*), streams (*Odo*), dumping grounds (*Akitan*), markets (*Oja*), shrines (*Ojubo*) and city centers (*Ojude*).But the division between public and private space is a complex one, and for researchers such as Lawuyi[18] and Asakitikpi[19], the division of private and public is explained as rooted in a ritualistic perception of space, composed of corporeal (physical) and spiritual (meta-physical) factors[20]. While this perception holds anthropologically true to an extent, the ritualized use of (and indeed the psychology of) space among the Yoruba, the dynamics of urbanization, population growth and domestic waste management especially, are rooted in socio-economic and socio-historico-cultural factors, all of which compose the space-identity relation.

Space and identity therefore becomes an importantly topographical equation as domestic waste in Ibadan continues to create a complex and problematic profile for its spaces and residents (psychologically and physically). In Ibadan, domestic waste is mostly deposited on building sites, road-sides, in the stream, as well as market and public school spaces. These are spaces belonging to 'others', perceived as separate and non-consequential to the 'Self'. Logically, this creates a public uncertainty and disorganization, commonly known as "others' problems". However, the chaos affects both "self" and "others", as the filth dumped in public places manifests in the form of health risks. The sense of community is thus a thorny one, especially when the responsibility of public management begins and ends with the geographical and psychological boundaries of private space.

The risks persist: poor waste management continues to live and grow 'abnormally' within the interface of an obsolete tradition twinned with community insensitivity to health risks caused by the low socioeconomic status of most Ibadan residents. While the discourse of waste management and health risks in Ibadan thrives on the above

16Asakitipi, E.A, "The Body, Health and Urbanization Process in Nigeria: A Study in Figurational Sociology". *Journal of Environment and Culture, Vol. 7(1):* 41-56, 2010.

17Ayantayo, J.K., "Religious Interpretations and Re-interpretations of Space and Environment in Nigeria: Implications for Inter-religious Conflicts". Journal of Pan-African Studies, Vol. 3(3): 116-130, 2009.

18Lawuyi, O.B, "Space and Sanitation: Identity, Power and the Management of Refuse in Osogbo, Nigeria". Journal of Environment and Culture, Vol. 1(1): 38-50, 2004.

19Asakitipi, E.A, "The Body, Health and Urbanization Process in Nigeria: A Study in Figurational Sociology". Journal of Environment and Culture, Vol. 7(1): 41-56, 2010.

20Lawuyi, O.B, "Space and Sanitation: Identity, Power and the Management of Refuse in Osogbo, Nigeria". Journal of Environment and *Culture, Vol. 1(1):* 38-50, 2004.

synergies, it also explains why Ibadan seems to assume a problematic identity – one which encroaches upon the psychological and physical realities of its residents, as well as upon private and public property.

1. The Ethnography of waste in Ibadan

Our ethnographic study was carried out in Ibadan, the capital of Oyo State, Nigeria. Ibadan is one of the most densely populated cities in sub-Saharan Africa with a reported population of about 2,550,593 in 2006[21]. Going by the 3% annual population increase in Nigeria, as of 2009, the Ibadan population rose to about 2,870,715 people. Ibadan is located approximately on longitude $3^0 5^/$ Greenwich meridian and latitude $2^0 3^/$ North of the equator. It rests within the trans-national zones of the high forest and the savannah. Ibadan has been described as a city of hills and valleys[22], lying within areas steeped in erosion and separated by areas of active and youthful landscape forms. It has a central range that runs roughly north to the south and divides the city approximately into two sections. This range lies between 227 meters in height[23]. The presence of many hills explains why heavy erosion characterizes Ibadan. Marking the hilly nature of this city, many areas assume identities that explain the naming of certain communities. Examples include Òkè-Àdó, Òkè -Àre, Òkè -Màpó, ÒkèBólà, ÒkèÀremo, ÒkèPáàdì and ÒkèSápátì. The hilly nature of Ibadan makes it possible for easy draining of heavy water generated from corrosive erosion that runs from many of its hills. Mostly, the erosion with heavy carriage capacity transports domestic waste generated by the residents who often explore the carrying capacity of the erosion to empty their waste. As it is often difficult to measure the extent of rainfall that causes the erosion, sudden stops in rainfall result in heaps of waste at the footrests of those hills and mountains that constitute the living areas in the city. The hilly terrains also make it almost difficult to easily access water at the mountain footrests due to the low-level underground water table[24].The city's built-up areas have two main streams, namely, the Ògùnpa and Kúdetì. By 1968, this built-up portion of the city had extended into drainage areas of Odò-Onà and Ògbèrè streams[25] . The Kudeti streams joined Ogunpa at the southern part of the city,[26]however both streams and their tributaries serve commercial purposes characterized by open market stalls and popular traditional markets. The consequence of this is a sizeable production of market waste where streams are nothing but avenues into which are poured unregulated waste often lacking regular government attention and indeed proper legislative intervention.

21NPC, Nigerian Provisional Population Figures.Abuja, Federal Ministry of Information, 2006.

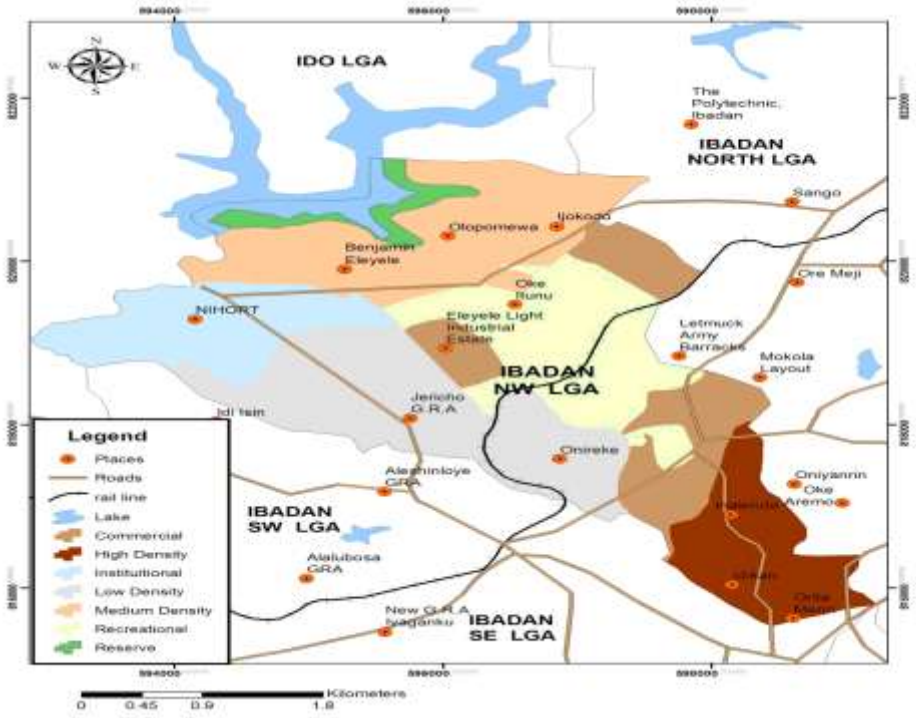
22Mabogunje, A.L, The Development Process. A Spatial Perspective, p. 192. London, Unwin Harman Ltd. 2nd Edition, 1980. Tejuosho, O.O, "Assessment of Generation and Management of Hazardous Household Wastes in Selected Communities in Ibadan", p.72.An M.P.H. Dissertation, Department of Epidemiology, Medical Statistics and Environmental Health, University of Ibadan, Nigeria, 2004.

23Tejuosho, O.O, "Assessment of Generation and Management of Hazardous Household Wastes in Selected Communities in Ibadan", p. 87.An M.P.H. Dissertation, Department of Epidemiology, Medical Statistics and Environmental Health, University of Ibadan, Nigeria, 2004.

24Olayinka, A.I, Imaging the Earth's Sub-surface, p.47. An inaugural Lecture Series, at the University of Ibadan, Ibadan, Nigeria, 2010.

25Filani, M.O, "Accessibility and Urban Poverty in Nigeria". In, Makinwa, P.K. and A.O. Ozo (eds.) Ibadan, Nigeria, pp. 128-138. Lagos, Evans Brothers Nigeria Publishers Ltd, 1987.

26Mabogunje, A.L, The Development Process. A Spatial Perspective, p. 123. London, Unwin Harman Ltd. 2nd Edition, 1980. Tejuosho, O.O, "Assessment of Generation and Management of Hazardous Household Wastes in Selected Communities in Ibadan", p. 74.An M.P.H. Dissertation, Department of Epidemiology, Medical Statistics and Environmental Health, University of Ibadan, Nigeria, 2004.



Map 1: Map showing major areas of Ibadan[27]

Ibadan is a metropolitan city, which has as of 2010, eleven local government areas (LGAs)[28]; with seven of these LGAs containing the main city, and the remaining four LGAs comprising the city outskirts and adjourning settlements. According to Abeyeba and Akinbo[29] , there is an influx of other nationalities besides that of local indigenes into Ibadan for the socioeconomic and political reasons which urge such migration[30]. The apparent deluge of migrants into the city has logically given rise to different patterns of residency. The choice of a place to reside in the city depends to an extent on one's level of income and spending power. With this population upsurge, the city has started to contend with the overwhelming production of domestic waste form private and public spaces, without proper channels for management. In many parts of the city such as Mólété, Odò-Onà, Ináléndé, Fòkò, Beere, Òjé and Òpo-yiosa, debris from domestic waste litter the streets and roads. In addition, the sewage system is poorly managed and proper channeling is undeveloped, thereby generating polluted grey-water and the expected pathological effects of such habitual patterns. As the situation continues unchecked and unmonitored, the identity of Ibadan continues unchanged. Consequently, due to the perfunctory attitude of the government to properly intervene, debris from domestic waste constituting a logjam that prevents the free flow of vehicular and pedestrian movements in the city. Thus, subject to inadequate environmental health education, low-income earnings, a lack of

27Iroko, B.1, Yoruba Talking Drum as a Means of Communication in Ibadan, Nigeria, p. 43. An undergraduate Essay in the Department of Archaeology and Anthropology, University of Ibadan, Nigeria, 2011.

28Local Government Areas in Nigeria are the third tiers of Nigerian federal government structure. As at 2010, there are 774 LGAs in Nigeria. Population and landmass varies from one LGA to the others, depending on population density in each location.

29Abeyeba, O.A. and J.A. Akinbo, "Pathogenic Intestinal Parasite and Bacterial Agents on Solid Wastes". East African Medical Journal, Vol. 79(11): 158-163, 2002.

30 NPC, Nigerian Population Figure. Abuja, Office of Statistics and National Planning, 2008.

determination on the part of the authorities and the unplanned use of space together with the surging population, the challenges to policy, planning and human health are both urgent and immediate.

Ibadan is said to be one of the dirtiest cities in sub-Saharan Africa, where domestic wastes constitute close to 85% of soil, water and air pollution[31]. In recognition of the risks posed to the health of its population, a compulsory monthly environmental sanitation program organized by the state government was put into place.[32] Yet, despite these pilot projects the identity of Ibadan remains both unchanged and constant in the habits and practices of its residents. Following the sanitation exercise, the regular stench from gutters once again infiltrated the streets, and domestic waste once again pervaded every nook and cranny of the city: the impending risks to human health were once again affirmed[33].

II. Interviewing

Our study was multi-sited and based on the socioeconomic factors that characterize residential patterns in Ibadan. The city is stratified into three main areas defined by income status, literacy level, road networks, accessibility to infrastructural facilities such as electricity, pipe borne water, and sanitation facilities. The areas are High Income Residential Areas (HIRA), Medium Income Residential Areas (MIRA) and Low Income Residential Areas (LIRA). The HIRA remit includes: New Bódíjà Estate, Olúyòlé – Extension, Alálùbósà, Àkóbò and the University of Ibadan staff quarters. Residents in these areas evidence higher income and a greater literacy level. Such areas also have well-planned housing and consistent layouts in keeping with architectural standards. Houses are constructed with cement and corrugated roofing sheets with many of them having state-of-the-art architectural designs. Town planning in these regions of the city is also professional, boasting good streets and road networks, frequent electricity and clean and serene environments for its residents. The region of MIRA comprises Ajibóde, Orogún, Sámońdà, Eléyelé and Sángo. These areas do have infrastructural facilities yet at a less functional level. The supply and quality of electricity and pipe borne water, for example, fluctuates. It is the medium income earners who live in MIRA. The Low Income Residential Areas (LIRA) are traditional settlements in Ibadan which include Bere, Òjé, Ináléndé, Ìtamérin, Òópó-yíòsà, Agbeni, Ògùnpa, Ayéyé, Agbowó, Lábó, and Odo-Ona, among others. These areas are the core concentrations of Ibadan indigenes characterized by mud houses which are occasionally plastered with cement. A network of narrow streets and roads pattern these suburbs and the majority of LIRA residents are of the low-income category – this reflected in extremely limited access to basic amenities such as water, electricity, hospitals, toilets, and sanitation services. This disproportion of income, quality of housing, education, and social access results in both spatial and psychological contrasts.

Our research divides Ibadan as such in order to provide a more holistic and integrated picture of regional based generated data, representing all classes of city residents. The categorization of Ibadan into these socioeconomic features further provides insight into how different classes of people perceive waste and the

31Tejuosho, O.O, "Assessment of Generation and Management of Hazardous Household Wastes in Selected Communities in Ibadan".p. 24. An M.P.H. Dissertation, Department of Epidemiology, Medical Statistics and Environmental Health, University of Ibadan, Nigeria, 2004.

32Tejuosho, O.O, "Assessment of Generation and Management of Hazardous Household Wastes in Selected Communities in Ibadan",p.80. An M.P.H. Dissertation, Department of Epidemiology, Medical Statistics and Environmental Health, University of Ibadan, Nigeria, 2004.

33Omoleke, I.I, "Management of Environmental Pollution in Ibadan, An African City: The Challenges of Health Hazards Facing Government and the People". Journal of Human Ecology, 15(4): 265-275, 2004.

concordant health risks. Through simple random selection, the following sites were selected for the study: New Bodija (HIRA), Ajibode (MIRA) and Inalende (LIRA). These three locales belong to different LGAs, and thus provided the opportunity to compare the strategies employed in waste management by the respective local authorities. From each site, a sample of 30 respondents was randomly selected. The selection of respondents reflected the socio-cultural variables of education, religion, gender structures and income levels. Considering that our study prioritizes non-restrictive qualitative information, inter-subjective sampling[34] was utilized to select both the research sites and respondents.

Our rationale is based on the eighteen months' of team ethnographic fieldwork in Ibadan, Nigeria[35]. Data collection involved an assortment of qualitative techniques, namely ethnographic observation, in-depth guided dialogues, and individual key informant interviews. Participants were both indigenes and non-indigenes resident in Ibadan. Non-systematic sampling was used, for our field study did not involve specific and specified field locations other than Ibadan.

As waste is a ubiquitous characteristic of the city, there is no spatial limit for sourcing information within Ibadan. This ethnographic approach implies that not all subject matter of research, even when hard data is necessary, can be adequately explored with the rigor of a systematic sample survey. It has been noted, for example, by Nyahmojoh, that in ethnography, subjective and inter-subjective accounts can be more socially telling and historically timely than reductive, objective sampling simply because not everything can be accounted for in statistical readings and not everything that can be accounted for is in fact important.[36]

The primary data used in our study resulted from a multiplicity of inter-subjective encounters with 94 respondents (34 key informants, 50 household heads, six top government officials belonging to the Oyo State Ministry of Environment, and four officials working in three local government areas from where the research sites were selected). A community surveillance study of common diseases focusing on malaria, typhoid, cholera and diarrhea was also conducted among the household heads in the three selected communities in Ibadan. The surveillance study based on a survey questionnaire format was designed to measure the health impact of waste generation and management in Ibadan community spaces. Aside from the primary sources of data collection, documentary records, and newspaper and magazine reports on waste management, proved a secondary-source research support.

Our study furnished both quantitative and qualitative data. The quantitative data from questionnaires were analyzed using descriptive analysis. Content analysis was involved as data analysis for the qualitative data. This process entailed deep routine interaction with data generated from the field on a daily basis throughout research sampling phases. Immediately after fieldwork sessions, all generated data were crosschecked and, where needed, further visits to sites were undertaken to fill certain gaps in the "raw" data collection. Following editing, transcription from electronic devices and translation of data into the English language was undertaken. Both the data from the research field diary and notes were extrapolated with that retrieved from the electronic devices. Sorting of the data according to the research objectives involved the writing of study objectives on separate sheets of paper, which were referred to as "objective cards" (this enables the researcher to constantly check the cohesion of his findings in line with the aims and outputs of research – one could call this a "running point" of reference).

34Nyahmojoh, F.B, "Fishing in Troubled Waters: Disquettes and Thiofs in Dakar". Africa, 75(3): 295-325, 2005.
35The author started the study of Ibadan management and health attitudes in 2005. In 2009, he encouraged his Msc. degree student, Miss Onyima Blessing, to further the study. This present report used part of the data collected by Miss Onyima Blessing.
36Nyahmojoh, F.B, "Fishing in Troubled Waters: Disquettes and Thiofs in Dakar". Africa, 75(3): 295-325, 2005.

Interviews were filtered to allocate relevant data to the appropriate "objective cards" which formed the frame and general rationale for report writing. All data was thoroughly anonymized to protect the identity of participants.

The nature and extent of domestic waste in Ibadan

Domestic waste in Ibadan is solid, liquid and gas in form. Due to low levels of industrialization in the city, there is less gaseous waste, save for the emission of carbon monoxides generated from the exhaust pipes of aged vehicles, which are commonly used for public transportation in the city. These vehicles, branded "Tokunbos" by the locals, were imported as used vehicles from overseas since many Nigerians cannot afford new overseas models. As affirmed by the research participants, gaseous and liquid waste is inferior in quantity and presence to solid waste in Ibadan.

The degree of domestic waste production differs based on the consumption pattern of each family or household, this in itself determined by the socioeconomic standard of the household and district. Both the income and educational levels remain common factors determining where individuals live and the quality of life asserted. These factors are equally determinants of the nature and extent of waste generated in different spaces, this, not only pointing to the spatial socioeconomic variable, but also the psychological reality and perception of waste, the associated health risks and the public knowledge (awareness) of waste management. In all Ibadan residential areas, domestic waste is usually generated from consumables, its quantity differing according to average income levels.

In Low Income Residential Areas (LIRA), waste from non-consumables occurs sparingly in their waste bins. Among the very few identified waste bins in Inalende, common waste includes packs of water; mostly nylons (commonly known as pure water nylons); local vegetable stalks (*ewedu*stems, *ugu* stems and onion wraps, among others); packaging of spices such as food seasonings; packaging of toilet soaps and human excreta, etc. Other common waste in LIRA is rags; covers of farm products such as cassava and yam peels; maize shells and corn wrappings. It is these small individual collections of household waste that aggregate to tons of debris every year and the community's "waste" identity. The common sights, the everyday landscape in fact, is that of accumulating waste particularly in public places such as school fields, gutters, bus stops and road sides. Typically, gutters and road sides are often littered with human excreta and animal carcasses. In Inalende (LIRA), where most houses lack soak-pits to dispose water from bathing and washing, grey water constitutes a frequent "type" of waste, often thrown on the roads (since residences are without drainage channels). Yet another characteristic of LIRA roads is the coagulated grey water in potholes – this, forming foul smelling stagnant pools.

While many residents in LIRA do not use waste bins, approximately 7% of the residents improvise by using large cellophane bags and local sacks bearing the words *Ghana must go* (the geopolitical tensions clear). Nonetheless, only 3% of those who use waste bins pay for professional collection. Others dispose of their packed waste in public spaces and road sides, gutters and in the streams that connect Inalende with Kudeti. As observed during the fieldwork, some inspected waste dropped by the road sides and those collected in waste bins (large transparent nylon bags) in Inalende mostly contained common waste in the form of rags, maize cobs, meat and fish bones, pure water nylons and vegetables., the majority of which are degradable[37] In a similar vein, two young teenage respondents disclosed that they also generate household waste such as empty tins of tomatoes, biscuits and "indomie" wraps, pure water nylon, vegetable refuse and human feces. On the latter point, through similar in-depth

37 Observation noted in Inalende on 06/06/2010. The respondent waived anonymity.

interviews with members of studied households in Inalende, our research learned that many households indeed use their waste bins as receptacles for human excreta due to the lack of toilets and infrastructural management.

More domestic waste is generated in LIRA due to insensitivity to the associated health risks. What accounts for this is the low-income level that subjects residents in these areas to live mostly on unprocessed foods. In LIRA, many residents purchase low standard foodstuffs from local markets. As purchasing power is heavily restricted waste scavenging is thus not uncommon: used clothes and household utensils are common objects thrown out from HIRA residents, appropriate by the residents of LIRA. The clustered housing patterns in LIRA areas also creates population congestion and leave little, if not any, community space for proper waste disposal. Small spaces such as the edges of streams and roadsides are in turn used as waste disposal grounds. Similarly, as many LIRA residents do not associate the spread of disease with unhygienic, polluted environments, the community remains unperturbed by the surmounting risks facing the residents in their daily spheres. In a strong, almost unbridled statement, which many residents regarded as altruistic, a respondent maintained that:

> Come on, all these wastes cannot cause disease. If they do, I want to tell you that nobody will live healthily in Ibadan again. I have been here since 1975. And that heap of waste you see there has been there for a while, and none of us has had cholera or typhoid, except occasionally when we have a malaria outbreak. Let me tell you malaria is not caused by a dirty environment, rather it is caused by exposure to the sun and fatigue at work[38].

In Middle Income Residential Areas (MIRA), domestic waste is also in form of left-over of consumable items such as food and utensils. The spatial nature of MIRA locales reduces population pressure on public space and in turn leaves adequate room for waste disposal in allotted zones. Ajibode, typical of many MIRA communities in Ibadan, features a number of artisans that open their workshops indiscriminately for the community. Examples include carpentry and joinery, auto-mechanics, iron welding, battery charging, tailoring and vulcanizing. These artisan workshops generate waste in the form of metal scraps, oil, batteries, cloth, and used tyres which are consequently disposed in open spaces, gutters and edges of streams. MIRA is itself not immune to the lack of public awareness which gnaws away at public sanitation and health standards.

In some cases where LIRA areas neighbor those of MIRA (as with Ajibode), some communities such as Báríkà and Agbowo (LIRA) engage in the indiscriminate dumping of refuse in MIRA dumping zones. MIRA housing patterns also accommodate the use of large waste bins. For instance, in some cases, large waste bins are jointly managed within the neighborhood of three to five closely-located houses – only applicable to MIRA residents who can pay for such collection services. In recent times, private waste collectors have been engaged in this service but in most cases the service is irregular and the overflowing of refuse in many waste disposal zones is common-sight. Since bins are often located in public spaces, when they are not emptied on time, a similar condition likened to that of LIRA waste management practices emerges, where most public spaces become littered with refuse.

MIRA residents, however, comply with public policy on residential planning and policy. In Ibadan, the 1982 housing regulation and planning edict[39] stipulates that every house must be fitted with a toilet otherwise

38 Statement from Mr. Jimoh at Inalende on September 7th, 2010.
39 Section 32, Housing Regulation and Planning Edict, 1982, Oyo State Gazette.

building approval is not granted. This policy protects MIRA space and prevents the area from being a receptacle of human excreta. Contrastingly to LIRA, where most houses lack toilet facilities and where most waste is dumped into "public spaces", human excreta is not usually sighted in MIRA due to the availability of toilets in most of the community homes. Although the 1982 housing edict is, and should be, applicable to LIRA communities, crumbling houses, low income and lack of space means that LIRA fails to comply with policy. As noted by one of our respondents:

> No government official can come here to enforce that law. We would ask, where they come from[40].

In a similar perspective, a landlord and a community head in LIRA explains that:

> It is difficult for such law to be enforced here. People are very poor to raise money to build such a standard house fitted with a toilet[41].

In contrast to the private space sanitation problematic in LIRA, opinions generated from most of our key participants in MIRA suggest that both the community and the government seek compliance with the provisions of residential planning regulation. While landlords in LIRA are less concerned with meeting the legal standard of residential provision, most MIRA landlords (approximately 68%) expressed:

> In this community, the association of landlords will not even allow a new house to be built without compliance with house planning regulation. In the case of any deviancy, we quickly report to the Local Government House Planning Unit. Besides, local government also inspects the construction of new building projects.[42]

Droppings of livestock essentially from ruminants, dogs and domestic birds constitute a substantial feature of the unregulated waste pervading MIRA public spaces such as roadsides, school premises and market squares. Livestock are reared in open ranges to supplement the middle income earnings of residents, and as most of the MIRA spaces such as Ajibode have not been utilized, they contain quantities of grass, worthy for animal grazing

The nature and extent of domestic waste in High Income Residential Areas (HIRA) is remarkably different from both LIRA and MIRA communities. Due to higher income levels and access to a complete education, HIRA residents mostly rely on processed foods, which are packed in cans, paper and nylon, all of which constitute the bulk of HIRA generated waste products. Since the residents are indeed more educated and formally qualified, they are mostly white-collar professionals, who tend to generate more paper waste than in either LIRA or MIRA. Every house in HIRA, moreover, strictly complies with house planning regulations: all residences are carefully thought out with a conspicuous demarcation of housing parameters. Toilets are of an established sanitary standard, and sources of water in the form of boreholes and deep wells are sanitarily guaranteed. Access to public sources of water is also a daily feature, which does not, however, flow regularly. In 1985, as was the case of Bodija Estate in Ibadan, the Landlord Association introduced the use of waste bins for each house. Between 1985 and 2007, the waste bins were

40Opinion of a resident in Inalende. The interview was held June 23rd, 2010.
41 An interview held June 22nd, 2010 with a Landlord in Inalende.
42 An interview held June 22nd, 2010 with a Landlord in Ajibode.

freely emptied by the local government public waste management board (LGPWMB). However, since 2007, due to the inefficiency of the board and its programs, private organizations were drafted for the collection of waste in the Bodija district. According to a respondent, "this arrangement is desirable as the government services of waste management became faulty, so the Landlord Association organized private ventures to collect our domestic waste here in Bodija.[43]"

In contrast with LIRA, where waste bins are over-filled without regular disposal for several days, in the Bodija (HIRA) community, rubbish is regularly packed as residents are individually responsible for the collection. Private collectors are contracted and failure to fulfill this responsibility often attracts public ridicule or humiliation from the HIRA community, for as one resident noted: "anybody who fails to empty his waste bins is an irresponsible person. He or she is not expected to be called a house owner and it shows that he or she lacks community responsibility."[44] The difference of attitude towards space management between LIRA and HIRA also reflects the politics and indeed, the psychology, of space which characterize these districts.

III. Discourses and Counter-discourses on Ibadan's Identity

The problem of waste and its poor management in Ibadan generates a complex discourse about the city's space, her identity and the psychological realities which manifest as consequence. Typical of identity construction is the perception of "self" and "others". As is well learned within philosophy and sociology, the "self" (that age-old Cartesian concept) is built on a "difference" (both objectively environmental and phenomenologically atmospheric). In the case of Ibadan's identity, indigenes constitute a collective identity where the widespread perception is that such city space is no different to that of other spaces in Nigeria, in terms of waste generation and its poor management. On the other hand, there are "others" (non-Ibadan indigenes) who consider the waste generated in both MIRA and LIRA communities as "problematic" and "polluting" – these are common adjectives which are pinned to the very identity of the residents. It is therefore the widespread perception of those outside the city which contrasts with the perception of those inside: geographical space, community space and psychological space are thus telling concepts in this equation where a counter-discourse emerges from within and without.

It is often argued that Ibadan is an ancient city accommodating a large number of migrants from different parts of Nigeria, and since the city continues to grow in line with demographic variants, it is difficult to maintain a clean environment. In addition to this, as a result of age, many old residences especially in LIRA communities lack modern features, and consequently fail in the attempt (whether concerted or not) to adapt to demographic change. Other LIRA communities such as Sabo and Sasa are largely dominated by migrants from northern Nigeria, and are highly congested with these poor housing facilities.

The opinions of some of our key informants, however, who are Ibadan indigenes, differ from the conceptualization of Ibadan as this unhygienic city. As noted in Inalende:

> Ibadan is clean, it is a big city, and there are a lot of ancient settlements compared to the new sites. These communities differ because the people living in a space determine its neatness. Those dirty areas with dilapidated houses were built about 60 to 100 years ago. Initially, there were toilets but when the toilets got filled, there were no spaces to dig another, and people resorted to excreting in nylons which were later found on

43 Interview held with a landlord inBodija, August 13th, 2010.
44 Interview held with a resident of Bodija Estate, August 13th, 2010.

> the roads. The government should build enough public toilets in all local government areas. They can even demolish these old houses and compensate their owners adequately to build new ones because the government has money[45].

Contrary to the above, other respondents described the situation in which they found themselves as frankly "horrible" – this, in contrast to the position of other indigenes who seek to salvage Ibadan's identity through a rationalization of excusable factors. For instance, an Ibadan resident in Inalende (LIRA) screamed when interviewed, expressing: "*Òré, e jókò ó, wàhálàtí a níníàdúgbòyitipòjù*"[46] translated as, "my friend, sit down because the problem facing us in this community is too much!" Ibadan to this resident is an unlivable reality, it is traumatic and without resolve: most of the houses lack toilets and residents defecate in nylons which are stored until rainfall before being disposed of into flooding water. During the dry seasons, these are stored until another rainy season arrives. As voiced, "[…] the greatest problem here is the lack of water. We also don't have dumping ground for our domestic waste." And elsewhere a female indigene of Ibadan explained that, "if rain no fall, we no go get water, nawetin' we de suffer for here.[47]"

Central to the opinions generated from MIRA and HIRA respondents, Ibadan people constitute the bulk of the residents in both these regions. LIRA communities appear to bear the brunt of both excesses as well as little support from authorities. In particular, HIRA respondents assert that Ibadan indigenes are mostly insensitive to change because they tend to keep to local traditions, preserving the autochonous role. In the case of waste generation and disposal, a respondent from HIRA maintained: "I could not understand why landlords in Inalende cannot pay for the collection of their waste as we do here in Bodija. I know that the people there will say that they have space to dump their waste. Where are those spaces? Roadsides and gutters? Most Ibadan indigenes live in the past of 60 to 100 years ago." In another counter argument from a resident in Inalende: "government favors Bodija, because that is where many government officials reside. Thus, they provide for themselves facilities to make their space clean. Here there are no good roads, but Bodija has good roads. If there is no good road, how do you want refuse collectors to collect our refuse in Inalende? We cannot build roads by ourselves. It is the responsibility of the government to build roads. It is the failure of government to provide infrastructure that makes Inalende (LIRA) community a dirty one." These counter arguments subsist while Ibadan continues to live in unsanitary conditions, with the adverse effects being felt, although not immediately perceived, in LIRA communities which are virtually dominated by Ibadan indigenes.

Domestic Waste and Perception of Health Risks in Ibadan

In all the study locations: Inalende (LIRA), Ajibode (MIRA) and New Bodija (HIRA), 44% of all respondents (90 in total) perceived domestic waste as inherently adverse, carrying potential health risks. While the remaining 56% also perceive domestic or household waste as risky, they nevertheless hold to the view that domestic waste is not a significant danger to health and community wellbeing. There is an argument, however, in support of the harmlessness of domestic waste, centering on the belief that waste can be converted into wealth through recycling, and that it can be used as manure for cultivation of agricultural products which in the long-run is beneficial to Man. According to a respondent, who spoke in Pidgin English,

45 Personal interview September 9th, 2010 with Mr. Adeleke in Inalende.
46Personal interview with an indigene of Ibadan resident in Inalende. The interview was held on 10 September, 2010.
47 Interview held with MrsOpeyemi on 13/06/2010 at St. Stephen's Church at Inalende, Ibadan.

> This dirty we de talk about, them fit use am for manure for our farm but nobody de come our side to gather am[48]

By this it is expressed that domestic waste could be used as manure for farming. While this idea is more popular in both MIRA and HIRA communities, the LIRA respondents (who also believe in the functionality of domestic waste) ritualized the perception of risk. It is common-place belief for LIRA communities that there is indeed no space without risks and that human being lives naturally exposed to risk – it is part and parcel of existence. To many LIRA people, the generalized belief is that "risk" is not bound by space – it is unbound, transcendent almost, and relative to the destiny of each. In support of this perception, one respondent maintained that:

> Even in Bodija, which you refer to as clean, do you mean that people do not die there? Do you mean that there are no diseases there? Can you prove to me that they are not susceptible to environmental related diseases? So everywhere is risky[…][49]

The above responses from LIRA residents suggests that it is not waste that constitutes health risk and while most of these respondents affirm that poor management is indeed poor practice, it is in their eyes "*only God that keeps human health. Good or bad health does not necessarily mean that one lives in a dirty space.*"[50] Such responses were further strengthened with the common idiomatic sayings among the Inalende residents, *"dirty no de kill*", meaning that *dirt or filth cannot kill*. Also stressed was that living and surviving with poor waste management constituted an important factor to community biographies where as, "children […] were born here, grew up here and lived ripe ages before they die. Here, I want to inform you that we live a longer life than those living in Bodija that is regarded as clean." Some respondents further stressed that health problems such as malaria, typhoid and diarrhea, are incorrectly perceived by authorities: "They will ask us to clean, we will clean, but it is a surprise to also hear that those diseases also affect Bodija that is regarded as clean."

The above inferences and responses suggest what constitutes risk and what determines its perception in environmental health. Among low-income earners, dirty environments do not supposedly carry health risks unless providenced by a divine power. This spiritualization of unsanitary conditions is rooted in the community belief that God gives for life and survival even if such space is unsanitary and polluted – waste is nothing other than a corrosive, superficial sublimate which cannot affect the profound and divine providence of space and existence – waste and filth, consequently, have little to do with destiny. To such communities, risk is human, and a natural activity that impairs human health if divinely intended to do so. According to a respondent interviewed in Inalende, "*truly we were told that waste can impair human health, but in Inalende poor management of waste is not risky, because it does not impair our health."* Arising from the above is the fact that many low-income earners in Ibadan, believe that they have a markedly reduced susceptibility and vulnerability to diseases caused by poor waste management, believing themselves closer to a divine plan and intervention by virtue of their autochonous identity. Contrastingly, most respondents who believe that waste poses a substantial risk to human health are those who reside in HIRA zones, adhering to a different rationality and concept of wellbeing. HIRA residents are of the opinion that waste constitutes both direct and indirect health risks grouped as biological, natural, and environmental. In their perception of health and domestic waste, biological risks involve the potential outbreak of epidemics such as

48 Personal interview held with Mr. Yinka on 11/06/2010 at Inalende, Ibadan.
49 Personal interview held with a key informant in Inalende, Ibadan.
50Personal interview with Mr. Olawole in Inalende, Ibadan.

skin diseases, cholera (*Aisanonigba-meji*), diarrhea, malaria, measles and tuberculosis. Whilst respondents affirmed that no records of such epidemics existed in Bodija, they nevertheless believed that health education and public access to knowledge was vital in showing how disease vectors can breed from decomposed domestic waste, and in turn, cause infections and epidemic pathology.

All the respondents in Bodija (HIRA) shared the view that poor waste management can indeed lead to parasitic and pathological community endangerment – divine intervention or providence does not feature in their reasoning. They further affirmed that flood, severe erosion, and submerged earth can result from the indiscriminate dumping of refuse. References were made to certain places in Ibadan that were exposed to erosion and flooding in the past due to such practices. Often recalled during interview was the famous "*Omiyale*" incident in the 1980s, which flooded houses, destroyed properties and stocks. According to Mrs Omavauye who has lived in Bodija since 1976:

> In 1980, Ogunpa River was filled up with all sorts of wastes by residents of Ibadan. The river channels were blocked and there was a severe flood that led to the death of uncountable numbers of people. Dem no fit count the number of people wey water kill, for family of seven (7), two remaining. Markets (goods in stores) wey water carries plenty bags of salts soak with water.[51]

Waste Management in the Context of Health and Culture in Ibadan

Ibadan space is dominated by low-income populations living on the city margins which are characterized by unplanned settlements with poor infrastructures. Poor waste management is a primary characteristic, which on the one hand constitutes the recognizable and identifiable psychological hallmarks of the majority of Ibadan residents as well as Ibadan space. The culture, on the other hand, predisposes the residents to various and varied health attitudes. Among such health attitudes is the vulnerability to incidence of diseases such as cholera, malaria, typhoid and diarrhea. In a comparative community surveillance of common diseases (throughout LIRA, MIRA and HIRA communities), a correlation exists between the culture of poor waste management and health risks (malady occurrence). Relying on a household survey of 45 homes equally selected among the three communities, questionnaires were administered with the heads of the selected households who were directed to report on the occurrence of four diseases over a four month period. Each of the selected households in LIRA had, at the time of interview, between four and eleven members, with each household recording occurrences of each of the diseases (table 1). Household populations in MIRA and HIRA had between three and seven members, with more households in MIRA having a higher frequency of between five and seven members. In contrast, but not surprisingly, the survey responses suggested that diseases directly related to community sanitation are more prevalent in LIRA than other Ibadan communities.

51 Interview with Mrs Omavauye in Bodija on 4/06/2010.

Common Diseases	LIRA(Inalende) N-15	MIRA(Ajibode)N-15	HIRA(Bodija) N-15	Total (N-45)
Malaria	12(80%)	8 (53.3%)	5(33.3%)	25(55.5%)
Cholera	9(60%)	5 (33.3%)	1(6.6%)	15(33.3%)
Typhoid	11(73.3%)	5 (33.3%)	3(20%)	19(42.2%)
Diarrhea	10(66.6%)	6 (40%)	1(6.6%)	17(37.7%)

Table 1: Household Prevalence of Common Diseases Associated with Environmental sanitation in LIRA, MIRA and HIRA communities

LIRA households clearly show a greater vulnerability to diseases directly related to poor waste management. Similarly, incidences were recorded in both MIRA and HIRA communities, where houses located close to sewage disposal channels and refuse-dumps recorded more occurrences of malaria and cholera. Houses without toilet facilities (mostly in LIRA communities) recorded increased occurrences of cholera, while those close to stagnant waste water recorded increased incidences of malaria.

IV. Discussion and Conclusion

In this paper, our intention was to explain the construction of a particular community identity using the trajectory of domestic waste in Ibadan. The politics of space are complex, influenced by psycho-social, socio-economic, mythic, and historical factors. We examined how different social groups and their socioeconomic status and residential patterns, result in certain "perceptions" of waste management and the concordant health risks in Ibadan. Underlying our argument is our consideration of space as an important cultural and natural agency that shapes human identity, the politics of which necessitate greater exploration of the bio-psycho-social condition as well as the perceptions of health risks posed in Ibadan, South-western Nigeria. In the case of this curious city, space for many years has been interpreted in terms of the human activities representing and fashioning it, as "filthy" and "dirty". While divergent opinions exist about whether Ibadan is in fact this polluted space, the extent and nature of waste generation and management in the city proves that, like many other sub-Saharan African cities, Ibadan contends with a conflict between city population growth and the effective management of waste – this, a tension marking the contemporary, everyday social reality of the population[52].

As Ibadan is certainly populated by marginalities, mainly residing in low-income Residential Areas (LIRA), most residents are resistant to changes in terms of housing patterns and waste management, but *resistance* here is not to be taken as a synonym for *adaptable*: the lack of access to regular environmental health education and public knowledge results in an unchanged, stagnant situation of public health and sanitation management – waste in LIRA is indeed a human consequence, but disease is sooner perceived as a divine consequence. This, coupled with

52Cross, P. and A. Morel, "Pro-poor Strategies for Urban Water Supply and Sanitation Services Delivery in Africa". Water Science Technology,51(8): 51-57, 2005.

the prolonged inability of the city's state government to address a mounting waste threat and public health alert, results in a tense and problematic identity.

Undermined by low levels of education, conscription in access to space and low income status, residents rationalize attitudes and practices concerning wellbeing. Health risks and the potential impacts of chemical, biological, physical or social agents on a specified human population under a specific set of conditions and for a certain time frame is very much the reality of Ibadan[53]. What we deem "risk" involves human activity that establishes a measure of probability of, and actual, harmful effects (hazards) to health[54]. The daily exposure to substances and uncontrolled processes of unmonitored production means that the regional (if not national) picture is a worrying one[55]. The majority of non-Ibadan indigenes constituting national "others" as against the (autochonous) "selves" of the city indeed believe that Ibadan in fact runs the risk of progressive health degradation, with poor management corroding the social fabric of the community identity and the wellbeing of the city's residents.

As evidenced by existing literature[56] and qualitative data generated from present research, our paper concludes that Ibadan faces the social and environmental obstacles well known to many sub-Saharan African cities, contending between city growth, waste management and the disproportion of public education and social awareness. To urgently bring these risks to bear upon modern scholarly consciousness and health systems analysis, there is a need for coordinated intervention and research, where the energies of both private and public institutions can engage with national policies, practices, legislative design, and the regional realities which often render these ineffective in the face of autonomous cultural trends and belief systems. Society's attitude towards waste management and the perception of health risk as a whole needs to be progressively attuned through public health education where all income and social levels have equal access to a knowledge which can ensure the improvement, empowerment and indeed the management of wellbeing. The need to increase national and regional outreach strategies, as well as regional pilot programs, into low-income communities, into the clusters and pockets, is pivotal, if awareness is to be increased, vulnerability to disease lessened, and if the wheels of development are to begin turning into a more constructive direction.

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53EnHEALTH, Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards. See, www.health.gov.au/pubhlth/strateg/enhlth/risk/

54Alaszewski, A. and K. Coxon, "The Everyday Experience of Living With Risk and Uncertainty". Health, Risk and Society, Vol. 10(5): 413-420, 2008.

55 Stephen, M. et. al.,Environmental Health Risk Management. A Primer for Canadians Graphic Services, p. 93. Canada, University of Waterloo, 2000.Gjernes, T, "Perceptions of Risk and Uncertainty among Sami Women Involved in Reindeer Herding in Northern Norway". Health, Risk and Society, Vol. 10 (Issue 5): 505-516, 2008.

56 Lesley, R, Health Hazards and Wastes Management. British Medical Bulletin, Vol. 68: 183-197, 2003.

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